

REMARKS

Applicants respectfully request reconsideration of the present application in view of the foregoing amendments and in view of the reasons that follow.

Status of Claims:

No claims are currently being cancelled.

Claims 1-7 are currently being amended.

Claims 8-16 are currently being added.

This amendment and reply amends and adds claims in this application. A detailed listing of all claims that are, or were, in the application, irrespective of whether the claims remain under examination in the application, is presented, with an appropriate defined status identifier.

After amending and adding the claims as set forth above, claims 1-16 are now pending in this application.

Claim Rejections – Prior Art:

In the Office Action, claims 1-7 were rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 6,278,797 to Nagasaki et al. This rejection is traversed with respect to the presently pending claims under rejection, for at least the reasons given below.

The present invention is directed to providing a board inspection apparatus or method which is capable of automatically correcting/adjusting the settings of inspection windows when the position or size of lands on the inspection target board has been changed due to changes in design rules for designing the board, so that the inspection windows are appropriately assigned with respect to the parts on the inspection target board.

According to the present invention, the set data for setting the inspection windows is automatically corrected by using an image taken from a model board for the board to be inspected. More specifically, the inspection windows, which are included in the inspection data pre-registered in a parts library (produced using an image of a board designed based on a prescribed, predetermined design rule) are read out from the parts library and assigned to the inspection target board. Then, when the design rule has been changed and the read inspection windows fail to correspond to size or position of the lands on the board, the read inspection windows are automatically corrected based on the image area of the lands on the model board

so that the inspection windows, after adjustment, appropriately correspond to the parts on the target board. Such automatic correction of the set data for the inspection windows will greatly contribute to time savings and labor savings in a board inspection process or system.

Turning now to the cited art of record, Nagasaki et al. is directed to an apparatus for inspecting a land-attached circuit board. Nagasaki et al. discloses that the inspection apparatus is capable of detecting the information on a land existing region, and the size, area, and formed position of the land. Nagasaki's inspection apparatus is also capable of inspecting height levels of the lands by two-dimensional scanning of an inspection beam, as described in the Abstract and column 12, lines 10-15 of Nagasaki et al. However, Nagasaki et al. does not disclose or suggest the above-mentioned features of the present invention as discussed above, and Nagasaki et al. does not disclose or suggest the correcting of inspection windows so as to appropriately correspond to the parts on a board to be actually inspected.

With respect to the features of correcting inspection windows, the Office Action appears to cite column 6, lines 50-57 and column 21, lines 4-25, as well as Figures 5, 10 and 25 of Nagasaki et al. However, these portions of Nagasaki et al. describe correcting a measurement error Δh in measured height of the land 4 in accordance with a deviation amount Δd on the position of a laser beam LB, which is caused when there is an error in a surface inclination angle of a polygon mirror 16, and is not concerned at all with correcting any inspection windows.

In connection with inspection windows, column 24, lines 39-44 of Nagasaki et al. describes that "a group of position tolerance defining windows PW for defining the tolerance or permissible range of the position where each land is formed is set on the inspection surface CP of the land-attached circuit board 1". However, Nagasaki et al. does not disclose or suggest correcting such windows PW when the size or position of the lands attached on an inspection target board has been changed. In fact, column 24, lines 49-52 of Nagasaki et al. describes that "the set position of the group of position tolerance defining windows PW on the inspection surface is the same so long as the land-attached circuit board 1 is of the same kind." In that regard, Nagasaki et al. actually teaches away from the presently claimed invention.

Accordingly, presently pending independent claim 1, which recites (among other things) that, based on the detection result, automatically correcting the set data for setting an inspection window included in the inspection data, so that the inspection window is adapted for inspection of the board, is not anticipated by Nagasaki et al. Presently pending independent claim 7 recites (among other things) correcting means for automatically correcting the set data for setting an inspection window based on the detected image area, so that the inspection window is adapted for inspection of the board to be inspected, whereby such features are not disclosed or suggested by Nagasaki et al.

New Claims:

New claims 8-16 have been added to recite additional features of the present invention that are believed to provide an additional basis of patentability for those claims, beyond the reasons given above for their respective base claims. For example, new claim 10 (and new claim 13, which recites similar features) recites that when the inspection window has been corrected using the image picked up from the model of the board having no parts mounted thereon, the image input means images a second board having parts mounted thereon, wherein, based on the imaging of the second model of the board, the registration means only registers the inspection data file after making a determination that the corrected inspection data is proper. See, for example, Figure 6 of the drawings, step ST7 in particular.

Also, new claims 11 and 14 recite that the inspection window is corrected using the image picked up from the model of the board on which no parts have been mounted. See, for example, page 22, first full paragraph, page 31, third full paragraph, and Figure 6 of the drawings.

Further, new claims 15 and 16 recite that the inspection data is automatically corrected when the image area corresponds to each land on the model of the board has been either increased or decreased with respect to the read inspection data. See, for example, page 38, first full paragraph of the specification.

Such features as recited in new claims 10, 11 and 13-16 are not disclosed or suggested by Nagasaki et al.

Conclusion:

Since all of the issues raised in the Office Action have been addressed in this Amendment and Reply, Applicants believe that the present application is now in condition for allowance, and an early indication of allowance is respectfully requested.

The Examiner is invited to contact the undersigned by telephone if it is felt that a telephone interview would advance the prosecution of the present application.

The Commissioner is hereby authorized to charge any additional fees which may be required regarding this application under 37 C.F.R. §§ 1.16-1.17, or credit any overpayment, to Deposit Account No. 19-0741. Should no proper payment be enclosed herewith, as by a check or credit card payment form being in the wrong amount, unsigned, post-dated, otherwise improper or informal or even entirely missing, the Commissioner is authorized to charge the unpaid amount to Deposit Account No. 19-0741.

If any extensions of time are needed for timely acceptance of papers submitted herewith, Applicants hereby petition for such extension under 37 C.F.R. §1.136 and authorize payment of any such extensions fees to Deposit Account No. 19-0741.

Respectfully submitted,

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